

# RECLAMATION

*Managing Water in the West*

**Design Standards No. 1**

## **General Design Standards**

**Chapter 1: Preparing and Using Design Standards**

**Chapter 2: Design Standards Index and Status**



**U.S. Department of Interior  
Bureau of Reclamation**

**January 2009**

## **MISSION STATEMENTS**

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

---

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

## **Design Standards Signature Sheet**

**Design Standard No. 1**

# **General Design Standards**

\

### **Chapters**

Chapter 1: Preparing and Using Design Standards

Chapter 2: Design Standards Index and Status

**Approved:**

---

**Deputy Commissioner, Operations**

---

**Date**



**Chapter Signature Sheet  
Bureau of Reclamation  
Technical Service Center**

**Design Standard No. 1**

# **General Design Standards**

## **Chapter 1: Preparing and Using Design Standards**

Summary of Changes:

**Deletions**

- Design standards transmittal form

**Revisions**

- Sections on Purpose, Available Standards, Engineering Judgment, Format, Metric Policy, Draft Standards, and Transmittal of Standards were all modified and updated.
- The section on Responsibility is now a section on Quality Control and Security Review Requirements.
- The Design Standards Index and Status have been moved to chapter 2 and updated.

**Additions**

- Review and updating schedule for design standards
- Example forms for Design Standard Signature Sheet, Chapter Signature Sheet, and Security Review Signature Sheet

- Style Guide (Visual Identity) for Reclamation design standards
- Section on use of computer programs, codes, standards, manuals, and guidelines
- Sections on including standard drawings and example drawings
- Security review requirements
- Requirements for posting design standards
- Review and signature requirements
- Appendix A – Project Management Plan Template for Updating Design Standards
- Appendix B – Style Guide for Reclamation Design Standards

**Prepared by:**

---

Arthur Glickman, P.E.

---

Date

**Technical Approval**

Not required

---

---

Date

**Peer Review:**

---

Michael R. O'Shea, P.E.

---

Date

**Submitted:**

---

Richard LaFond, P.E., Design Group Manager

---

Date

**Security Review:**

---

Larry Nuss, Division Security Reviewer

---

Date

**Approved:**

---

Lowell Pimley, Director, Technical Service Center

---

Date





# Contents

	<i>Page</i>
Chapter 1: Preparing and Using Design Standards	
1.1. General Sections .....	1-1
1.1.1 Purpose.....	1-1
1.1.2 Application of Design Standards .....	1-1
1.1.3 Deviations and Proposed Revisions.....	1-2
1.1.4 Available and Proposed Standards.....	1-2
1.1.5 Policy for Units of Weights and Measurements .....	1-2
1.1.6 Use of Computer Programs, Codes, Standards, Manuals, and Guidelines .....	1-2
1.1.6.1 Computer Programs .....	1-2
1.1.6.2 Codes, Standards, Manuals, and Guidelines.....	1-3
1.1.7 Drawings .....	1-3
1.1.7.1 Standard Drawings.....	1-3
1.1.7.2 Example Drawings.....	1-3
1.1.7.3 Location of Drawings .....	1-3
1.1.8 General Sections for Insertion in All Design Standards .....	1-4
1.2. Quality Control and Security Review Requirements.....	1-4
1.2.1 Roles and Responsibilities .....	1-4
1.2.2 Notification of Draft and Updated Standards .....	1-5
1.2.3 Review Requirements .....	1-5
1.2.4 Security Review Requirements.....	1-8
1.2.5 Design Standards Updates .....	1-8
1.3. Format .....	1-9
1.3.1 Visual Identity Guidelines .....	1-9
1.3.2 Chapter, Section, and Page Numbering .....	1-9
1.3.3 Figure, Table, and Equation Numbering.....	1-10
1.3.4 Drawing Numbering .....	1-10
1.3.5 Cover Pages for Chapters Prepared Separately .....	1-10
1.3.6 Inserting References.....	1-10
1.4 References.....	1-15

## Appendices

- A Project Management Plan Template for Updating Design Standards
- B Style Guide for Reclamation Design Standards

## Tables

	<i>Page</i>
Table 1.2.3-1 Summary of Review and Publication Process.....	1-6

## Figures

	<i>Page</i>
1.1.4-1 Example Design Standard Signature Sheet.....	11
1.2.3-1 Example Chapter Signature Sheet (two pages).....	12
1.2.3.3-1 Example TSC Security Review Signature Sheet .....	14

## Chapter 1

# Preparing and Using Design Standards

## 1.1 General Sections

### 1.1.1 Purpose

The design standards present clear and concise technical requirements and processes to enable design professionals to prepare design documents and reports necessary to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Compliance with these design standards assists in the development and improvement of Bureau of Reclamation (Reclamation) facilities in a way that protects the public's health, safety, and welfare, recognizes all stakeholder needs, and achieves the lasting value and functionality necessary for Reclamation facilities. The responsible designer(s) accomplishes this through processes that enable compliance with these design standards and all other applicable technical codes, as well as incorporation of the stakeholder's vision and values, that are then reflected in the construction project.

### 1.1.2 Application of Design Standards

All Reclamation design work, whether performed by the Technical Service Center (TSC), the Regional Director, or an architectural/engineering (A&E) firm, will conform to the design standards.

Reclamation's use of its design standards requires designers to also integrate sound engineering judgment with applicable national standards, site-specific technical considerations, and project-specific considerations to ensure suitable designs and protect public safety.

The design standards are not intended to provide cookbook solutions to complex engineering problems. Strict adherence to a handbook procedure is not a substitute for sound engineering judgment. The designer should be aware of and use state-of-the-art procedures.

### **1.1.3 Deviations and Proposed Revisions**

Whenever a design deviates from the standards, the designer should note the deviation and the rationale. The deviation and rationale for the deviation must be approved by the engineers technically responsible for the designs and concurrence obtained from the peer reviewer(s). Deviations from Reclamation design standards made by an A&E firm must be approved by the Reclamation Contracting Officer. Any deviation from the design standard must be documented and made part of the design records.

The designer should inform the TSC, via the Web site notification procedure, of any recommended updates or changes for the design standards to meet current design practices.

### **1.1.4 Available and Proposed Standards**

A complete list and status of all current and planned Reclamation design standards are contained within Chapter 2, "Design Standards Index and Status." Each time a design standard is revised or reprinted, the index/status chapter 2 will be updated.

Each design standard will contain several chapters and may be prepared and posted by two possible methods: (1) draft the entire design standard and post the entire design standard at once, or (2) draft the design standard one chapter at a time and post each chapter separately. When all chapters of a design standard are complete, the design standard signature sheet (figure 1.1.4-1) shall be prepared and signed.

### **1.1.5 Policy for Units of Weights and Measurements**

Reclamation design standards are to be prepared in the foot-pound-second (U.S. Customary Units) system of units for weights and measurements. Designers of record may select alternate units based on benefits and compatibility to project needs. These needs may include common industry practice of using another system, such as the International System (SI) units for weights and measurements, a requirement by congressional authorization, or a specific request by the client.

### **1.1.6 Use of Computer Programs, Codes, Standards, Manuals, and Guidelines**

#### **1.1.6.1 Computer Programs**

Description of, or reference to, specific Reclamation, other government, or commercial computer programs within a design standard shall be approved by those responsible for the development and review of the design standard. Identifying specific software programs should be avoided, unless they are unique in terms of their application and functionality.

### **1.1.6.2 Codes, Standards, Manuals, and Guidelines**

Nationally accepted design standards, manuals, guidelines, and building codes shall be used, as approved by Reclamation, when available and applicable. Examples include the American Association of State Highway and Transportation Officials (AASHTO) Bridge Design Specifications (current edition), the American Institute of Steel Construction (AISC) Manual of Steel Construction (current edition), and the American Concrete Institute (ACI) 318 Building Code Requirements for Structural Concrete (current edition).

Although nationally accepted design standards, manuals, guidelines, and building codes are preferred for use in Reclamation designs, recognition must be given to the need for specific or special requirements and minimum levels of design unique to Reclamation facilities and features. These specific requirements and minimum levels of design unique to Reclamation shall be clearly identified and defined in the appropriate design standard.

## **1.1.7 Drawings**

### **1.1.7.1 Standard Drawings**

Standard drawings shall be prepared in accordance with Reclamation's *Information Management Handbook*, volume 3 (Reclamation, 2008). Standard Reclamation drawings (40-D series) which can be used by Reclamation and non-Reclamation designers should be shown and/or referenced in each applicable design standard. Use of the standard drawings is recommended, as applicable, for consistency and efficiency.

### **1.1.7.2 Example Drawings**

Example drawings are often included in a Reclamation design standard to illustrate the requirements of the design standard. Example drawings may be taken from previous specifications or may be new drawings prepared specifically for the design standard. However, the drawings should not show means of access into Reclamation facilities. Example drawings prepared specifically for a design standard shall also be prepared in accordance with Reclamation's *Information Management Handbook*, volume 3 (Reclamation, 2008).

### **1.1.7.3 Location of Drawings**

If drawings are 8-1/2 by 11 inches in size, they should be placed where they are mentioned in the text. If they are larger than 8-1/2 by 11 inches, they should appear at the end of the chapter. For guidance on how to number standard drawings, see section 1.3.4, "Drawing Numbering."

## **1.1.8 General Sections for Insertion in All Design Standards**

The following sections of Design Standards No. 1 shall be inserted into each design standard or separately published chapter:

1.1.1 Purpose

1.1.2 Application of Design Standards

1.1.3 Deviations and Proposed Revisions

## **1.2. Quality Control and Security Review Requirements**

### **1.2.1 Roles and Responsibilities**

The design standards project manager (Director of the TSC) has overall responsibility for preparing, updating, reviewing, and disseminating the design standards. The Client Support and Technical Presentations Office of the TSC is responsible for formatting and posting all design standards.

The current line of authority for preparing and updating a design standard is as follows:

#### **1.2.1.1 Executive Leadership – Deputy Commissioner, Operations**

- Responsible for authorizing the program to update the design standards

#### **1.2.1.2 Executive Sponsors – Reclamation Design and Construction Coordination Team (RDCCT)**

- Act as liaison to all Reclamation offices

#### **1.2.1.3 Project Manager for M4E-16 (Managing for Excellence – Engineering Standards) – Director, TSC, or delegated authority**

- Responsible for general planning, coordination, tracking, and project direction of all tasks associated with M4E-16

#### **1.2.1.4 Delegated Project Manager for M4E-16 Task 2 (design standards update) – Chief, Civil Engineering Services Division, or delegated authority**

- Responsible for planning, coordination, tracking, and direction of all tasks associated with M4E-16 Task 2

#### **1.2.1.5 Design standard team leader**

- Responsible for preparation, planning, coordination, tracking, checking, peer review, and security review for a specific design standard preparation or update

**1.2.1.6 Design standard development team (DSDT)**

- Work under guidance of the design standard team leader to prepare, update, and review new or existing design standards

## **1.2.2 Notification of Draft and Updated Standards**

During the period that a design standard is being prepared or updated, draft versions will be posted on the Reclamation Web site(s) for review and use by Reclamation and non-Reclamation offices and organizations until the final standards are published. Two Reclamation Web sites will be used for the review and comment phases. The Reclamation Intranet Web site will be used for Reclamation wide reviews. The M4E Internet Web site will be used for the non-Reclamation reviews.

Notification for the Reclamation reviews will be provided by the M4E-16 Project Manager via e-mail. Notification of non-Reclamation reviews will be provided by the Policy and Programs Services office. The draft preparation, review, and posting phases are described in section 1.2.3.

Individual chapters of a design standard, when completed, will be posted as described in section 1.2.3.4.

The Executive Leadership (Deputy Commissioner, Operations) approves the final design standards. A memo via e-mail from the Deputy Commissioner, Operations, will notify Reclamation offices that the design standard is finalized and the Internet Website location to access the design standard.

Also, a memo from the Deputy Commissioner, Operations, will be distributed to Reclamation offices announcing the elimination of an unneeded design standard.

Notification to stakeholders of the completed design standards will be provided by the Executive Leadership. The completed design standard will be posted on the Reclamation Design Standard Internet Web site.

## **1.2.3 Review Requirements**

TSC peer review for scope of work, work breakdown, estimated staff-days, schedule of work, and progress tracking of the design standard will be performed in accordance with the TSC Operating Guidelines.

After all chapters of a design standard are completed, the Design Standard Signature Sheet (figure 1.1.4.1) is signed “Approved” by the Deputy Commissioner, Operations.

## Design Standards No. 1, General Design Standards-DRAFT

The design standards review and publication process for the chapters shall be in four phases, which are summarized in table 1.2.3-1 and specified thereafter.

**Table 1.2.3-1 Summary of Review and Publication Process**

<b>Phase No.</b>	<b>Phase description</b>
Phase 1: Prepare draft design standard chapter	Chapter Signature Sheet (figure 1.2.3-1) is signed by the preparer, technical approver, and peer reviewer
Phase 2: Review by Reclamation offices	Post on Reclamation Intranet Web site under direction of RDCCT for review and comments. The Design Group Manager signs the Chapter Signature Sheet as "Submitted" after the Phase 2 review is completed.
Phase 3: Public review	Office of Policy and Program Services posts the draft on the Reclamation M4E-16 Internet Web site. A security review must be provided and signed prior to posting. The Design Division Chief signs the Chapter Signature Sheet as "Approved" after the Phase 3 review is completed.
Phase 4: Post final signed chapter	Post completed chapter on the Reclamation Design Standard Internet Web site.

### Process for Preparing and Posting a Design Standard Chapter

The detailed process for preparing a design standard chapter is as follows:

#### 1.2.3.1 **Phase 1** – Preparation and review of initial draft:

- Initial draft is prepared by the Design Standard Development Team as directed by the design standard team leader and the technical approver. The draft is reviewed by the peer reviewer
- At the conclusion of Phase 1, the Chapter Signature Sheet (figure 1.2.3-1) is signed by the preparer, technical approver, and peer reviewer. The technical approver and peer reviewer shall be registered professional engineers.
- Draft design standards are to have the word "DRAFT" in the header.

#### 1.2.3.2 **Phase 2** – Reclamation-wide review

- RDCCT review.
- Post draft on Reclamation Intranet Web site.



- Notification that draft is posted and request for Reclamation review is sent via e-mail by the M4E-16 project manager.
- Reviewers send comments via the Intranet Web site.
- The design standard team leader updates draft and posts responses on the Reclamation Intranet Web site based on concurrence from the technical approver and peer reviewer(s).
- Minimum review time of 60 calendar days.
- At the conclusion of Phase 2, the Chapter Signature Sheet (figure 1.2.3-1) is signed “Submitted” by the Design Group Manager.

**1.2.3.3 Phase 3 – Review by the public and stakeholders.**

- A security review is required prior to posting on the Internet (Reclamation, 2003). The TSC security review is documented by signing the form, “TSC Security Review of Proposed Public Disclosure of Technical Information” (figure 1.2.3.3-1). The form is signed by the design standard team leader, the group manager, and the division security reviewer. The signature sheet is not included in the design standard but is filed separately.
- The Policy and Program Services Office posts the draft on the Reclamation M4E Internet Web site for public comment and review and sends notifications to stakeholders for review and comment.
- Stakeholders are identified by the Policy and Program Services Office. Stakeholders may include:
  - Private engineering organizations, Federal agencies, and State agencies that provide similar engineering services.
  - Water districts and utility companies.
- Notification of Internet posting and request for review sent by Policy and Program Services Office.
- Reviewers send comments to Internet Web site.
- The design standard team leader updates the draft based on concurrence of the technical approver and peer reviewer.
- Minimum review time of 60 calendar days.

- At the conclusion of Phase 3, the Chapter Signature Sheet (figure 1.2.3-1) is signed “Approved” by the Design Division Chief.

**1.2.3.4 Phase 4** - Post final document on Reclamation’s Design Standard Internet Web site.

- The design standard chapter is posted on the Reclamation Design Standard Internet Web site.
- If the chapter completes the update of a design standard, the Design Standard Signature Sheet (figure 1.1.4.1) is sent to the Deputy Commissioner, Operations, for approval. Approval is indicated by the Deputy Commissioner’s signature.
- Notification is sent by Deputy Commissioner, Operations, by mail and e-mail to Reclamation and stakeholders.

## **1.2.4 Security Review Requirements**

The material contained within a design standard is for use throughout Reclamation and outside of Reclamation by those performing analyses and preparing design documents for Reclamation facilities, and it will be posted on the Internet. The standards shall not contain information, figures, tables, drawings, or other components that will require a classification of “For Official Use Only” (FOUO) or “Secret,” as outlined in the *Reclamation Manual – Directives and Standards – Identifying and Safeguarding For Official Use Only (FOUO) Information*, SLE-02-01 (Reclamation, 2007).

All draft design standards shall be reviewed for FOUO classification by the division security reviewer prior to posting on the Internet. If information contained within the design standard requires the FOUO classification, the FOUO information shall be removed from the design standard.

## **1.2.5 Design Standard Updates**

Reviews of design standards will be performed every 3 years by Subject Matter Experts (SMEs) within Reclamation. An assessment will be made after these reviews as to whether individual chapters or the entire design standard should be updated. If a determination is made that individual chapters or the entire design standard should be updated, a recommendation with estimated cost for the effort will be submitted to the Executive Sponsor (Reclamation Design and Construction Coordination Team) describing the update requirements and justification for updating. If approval of the design standard update proposal is received from the executive sponsor, a Project Management Plan (PMP) will be prepared that addresses the specific update needs and plan. The proposal for updating design

standards or creating new design standards should include: scope of work, reason for work, budget, and schedule requirement. The proposal may be submitted using the PMP template shown in appendix A.

The PMP will be transmitted to the project manager (Director, TSC, or representative) by the agreed-upon date. After review and acceptance by the project manager, the PMP will be signed by the designated representatives responsible for workload and resource allocation within the DSDT member's group.

## **1.3 Format**

### **1.3.1 Visual Identity Guidelines**

The format for the design standards shall be in accordance with Reclamation's Visual Identity guidelines. The Visual Identity guidelines are used to provide a consistent look and tone, and to convey a professional image for Reclamation documents. The general format used for this chapter should be followed for subsequent portions of the design standards. The word processing software currently supported for Reclamation-wide use shall be used to prepare the text.

Attached in appendix B is a style guide that can also be found on the Reclamation Intranet Web site.

### **1.3.2 Chapter, Section, and Page Numbering**

When numbering chapters and sections, the first number refers to the chapter, the second number refers to the section, the third number refers to the subsection, and so on. (For example, the number "1.3.2" refers to chapter 1, section 3, subsection 2.)

Page numbering for introductory pages and the table of contents should be in small roman numerals. Page numbering for the chapter itself should begin with page 1 and include the chapter number. (For example, the first page of chapter 1 would be listed as 1-1). Page numbers should be placed at the bottom outside margin and should alternate from left to right.

In addition to the page number, also list the design standard number, chapter number, and revision number, as well as the date. This should appear at the bottom inside margin and should alternate from left to right. For an example, see the bottom of this page. "DS-1(1)-9" refers to Design Standard No. 1, chapter 1, revision 9.

### **1.3.3 Figures, Tables, and Equation Numbering**

Figures, tables, and equations should be numbered according to the section of text in which they are **first** mentioned. They should then be followed by a hyphen and the appropriate sequential number. For example, if two figures are mentioned for the first time in this section, they would be labeled “figure 1.3.3-1” and “figure 1.3.3.-2.

### **1.3.4 Drawing Numbering**

Drawings are considered figures. Therefore, they are numbered in the same way figures, tables, and equations are numbered; that is, according to the section in which they are first mentioned in the text. For example, a drawing mentioned in this section would be labeled “figure 1.3.4-1.”

### **1.3.5 Cover Pages for Chapters Prepared Separately**

An example cover page for a chapter prepared separately is shown in appendix B.

### **1.3.6 Inserting References**

References should be made in the text by author and date. If no author is provided for a reference, list it by agency and date. In addition, full reference information should appear in the References section.

Figure 1.1.4-1

## Example Design Standard Signature Sheet

**Design Standard – (Insert design standard number and title)**

**Chapters**

(Insert chapters and titles)

Approved:

\_\_\_\_\_  
**Deputy Commissioner, Operations**

\_\_\_\_\_  
**Date**

Figure 1.2.3-1

## Example Chapter Signature Sheet

<b>Chapter Signature Sheet</b>	
<b>Bureau of Reclamation Technical Service Center (Insert Design Group)</b>	
<b>Design Standard – (Insert design standard number and title)</b>	
<b>Chapter – (insert chapter number and title)</b>	
<b>(If draft, insert review phase and date)</b>	
<b>Summary of changes: (Insert revisions, deletions, additions)</b>	
<b>Prepared by:</b>	
_____ Prepared by: (insert name) Design Standard Team Leader	_____ Date
<b>Technical Approval:</b>	
_____ Technical Approval (insert name)	_____ Date
<b>Peer Review:</b>	
_____ Peer Review: (insert name)	_____ Date

**Submitted:**

\_\_\_\_\_  
Design Group Manager (insert name)

\_\_\_\_\_  
Date

**Security Review:**

\_\_\_\_\_  
Division Security Reviewer (insert name)

\_\_\_\_\_  
Date

**Approved:**

\_\_\_\_\_  
Design Division Chief (insert name)

\_\_\_\_\_  
Date

Figure 1.2.3.3-1

## Example Security Review Signature Sheet <sup>1</sup>

### **TSC Security Review of Proposed Public Disclosure of Technical Information**

**Type:** Design Standard

**Design Standard:** Design Standards No. 1 – General Design Standards

**Chapters:** 1. Preparing and Using Design Standards  
2. Design Standards Index and Status

**Brief Description of Information:** Provides information for preparation and use of design standards plus an index and status of all design standards.

**Requesting/Sponsoring Organization:** Director, Technical Service Center

**Program Office:** Deputy Commissioner, Operations

**Is Information Official Use Only / SENSITIVE?** (Y/N) \_\_\_\_\_  
(to be completed by reviewer)

**Is Information Official Use Only / RESTRICTED?** (Y/N) \_\_\_\_\_  
(to be completed by reviewer)

(Sensitive or Restricted information shall not be included in a design standard.)

**Design Standard Team Leader:**

Name(s)/Mail Code(s):

Signature(s)/Date(s): \_\_\_\_\_

**Group Manager(s) Approving Release:**

Name(s)/Mail Code(s):

Signature(s)/Date(s): \_\_\_\_\_

**Division Security Reviewer(s) Peer Reviewing Approval:**

Name(s)/Mail Code(s):

Signature(s)/Date(s): \_\_\_\_\_

\_\_\_\_\_

<sup>1</sup> This signature sheet is not included in the design standard but is filed separately.



## 1.4 References

### Technical Service Center

Bureau of Reclamation. 2008. *Reclamation Information Management Handbook*, Volume 3.

Bureau of Reclamation. 2003. *Security Review Guidelines for Disclosure of Technical Information*.

Bureau of Reclamation. 2007. "Identifying and Safeguarding For Official Use Only (FOUO) Information," SLE 02-01, *Reclamation Manual, Directives and Standards*.



Appendix A

# **Project Management Plan Template for Updating Design Standards**



<b>M4E-16 TASK 2 – DESIGN STANDARDS UPDATE</b>	
<b>Project Management Plan for Updating</b>	
<b>Design Standard No. (Insert Design Standards No. and Title)</b>	
Job Name: Update Design Standard No.	Date Submitted:
JCN:	WOID:
Team Leader:	Client Group or Region: N/A
Supervisor:	Client Office: Karl Wirkus, Deputy Commissioner, Operations
Project Manager or delegated authority: 86-68120, (303) 445-3226	Client Contact: Director, Technical Service Center

**1. Purpose and Goals:**

- a. Team 16 concluded that Reclamation has a legitimate need for internal design standards. However, the Team also believes there are opportunities for Reclamation to adopt more national standards in lieu of maintaining Reclamation-specific standards.
- b. Reclamation's use of its design standards needs to integrate sound engineering judgment with applicable national standards, site-specific technical considerations, and project-specific considerations to the extent that public safety is not compromised.
- c. Reclamation needs to better manage and organize its design standards, make development of the standards more transparent to its stakeholders, and make the standards more readily accessible for all Reclamation offices, Reclamation stakeholders, and members of the American public.
- d. The TSC review and development of each design standard will be conducted in a manner that allows input from all Reclamation offices, as well as Reclamation's water and power users.
- e. Formally announce the selection of each current standard for use by Reclamation.
- f. Formally announce the update of each out-of-date standard.
- g. Formally announce each decision to eliminate unnecessary Reclamation standards to all Reclamation offices.
- h. Post Reclamation design standards on Reclamation's Internet Web site to ensure they are readily accessible.

<b>2. Products:</b>		
CHAPTER NO.	EXISTING DS-(insert DS number) CHAPTERS	PROPOSED NEW OR REVISED DS- (insert DS number) CHAPTERS
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

**Design Standards No. 1, General Design Standards**

**3. Schedule:**

Major Milestone	Dates	Notes

**4. Financial Plan:**

Summary of Staff Days and Cost by FY

FY	SL1	SL2	SL3	SD Total	\$ (Labor)	\$ (Non
Totals						
Total DS No. (Insert design standard and chapter number) Budget =						

**5. Roles and Responsibilities:** See Design Standards No. 1, Chapter 1, Subsection 2.1, "Roles and Responsibilities."



**6. Quality Control:** See Design Standards No. 1, Chapter 1, Section 2, “Quality Control and Security Review Requirements.”

**7. Change Management:**

- (a) If an adjustment in this PMP is required for either schedule or budget, the proposed modification will be prepared by the DSDT member requesting the change for a particular task and a written request (see attachment 1 for change order form) describing the modification will be sent to the project manager by the design standard team leader for approval prior to making any adjustments to the PMP.
- (b) If approval is obtained (documented via e-mail) from the project manager, work will proceed on that particular task as agreed to in the modification.
- (c) If approval cannot be obtained from the project manager, the design team leader, the design standards development team member involved in requesting the modification, and the project manager will discuss and resolve the need and amount of adjustment in schedule or budget for that particular task.
- (d) If resolution of a request for modification cannot be obtained in steps (a) through (c) above, the issue will be raised to the project manager (Director, TSC) to seek resolution. All work that is not affected will continue as planned and scheduled.

## **8. Communication:**

TSC DSDT meetings will be held as frequently as weekly, if required, during the first month of activity and no less frequently than monthly through completion of the work described in this PMP.

Status report meetings will be held no less frequently than quarterly between the DSDT members and leader, and the M4E-16 Task 2 Manager. These meetings will be conducted to assess progress; address resource, budget, and schedule issues; and to assist the DSDT with policy and procedure issues or concerns.

See also Chapter 1, Section 2, “Quality Control and Security Review Requirements,” for the internal and external review coordination process.

### **Status reports:**

Quarterly status reports will be issued to report overall design standard progress, evaluate expenditures versus accomplishments, present changes or problems and their resolutions, and present planned activity for the upcoming quarter.

## **9. Risk Management:**

The following risks are identified as having a moderate to high probability of occurrence. These risk events will be monitored throughout the development of the design standard. Other risk events not discussed below that impact the development of the design standard will be managed by the change management process.

**Risk No. 1:** Available funding is reduced or eliminated, resulting in modification to scope of work, budget, and/or schedule. If this occurs, the PMP will require revision.

**Risk No. 2:** Lack of qualified Reclamation resources (either current or retired employees) to perform tasks identified for SMEs. If this occurs, the PMP will require revision.

**Risk No. 3:** Modifications in the currently anticipated scope of the work may be revealed as work progresses (e.g., additional chapters may be identified). If this occurs, the PMP will require revision.

**Risk No. 4:** The nature and extent of interaction with stakeholders (and/or their A&Es) are not well defined at the time this PMP is being developed. The timeframe and staff-day estimate reflect the assumptions and anticipated effort to complete this activity. This PMP may require revision to address this issue once tasks are underway should the original assumptions of this interaction prove inaccurate.

#### 10. Project Closeout:

Perform recordkeeping in accordance with Federal records policies and procedures.

Contact the client liaison (86-68010) and ask to have the WOID closed.

Write a summary for the project manager concerning the scope of the design standard, significant items discussed during the development, and potential items for future inclusion.

#### 11. Signatures: The following signatures indicate approval of this contract:

\_\_\_\_\_  
DSDT Leader (name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Project Manager (name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Group Manager, 86-68xxx (name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Group Manager, 86-68xxx (name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Group Manager, 86-68xxx (name)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Group Manager, 86-68xxx (name)

\_\_\_\_\_  
Date

## Attachment No. 1 Change Order Form

Design Standard No. (Insert Design Standard No. and Title)  
Chapter No. (Insert Chapter No. and Title)

### Change Order Form

Task or Subtask ID: \_\_\_\_\_

Task or Subtask Title: \_\_\_\_\_

Change No.: \_\_\_\_\_

WBS No.: \_\_\_\_\_

Task Name: \_\_\_\_\_

Added Cost: \$ \_\_\_\_\_ SL1 \_\_\_\_\_ SL2 \_\_\_\_\_ SL3 \_\_\_\_\_

Budget: \_\_\_\_\_ No Impact \_\_\_\_\_ Contingency Fund

Schedule: \_\_\_\_\_ No Impact \_\_\_\_\_ Slip (No. of scheduled days \_\_\_\_\_)

Reason:

\_\_\_\_\_  
\_\_\_\_\_

Major: (Change in Scope)

New Requirement (Attachment Yes/No)

\_\_\_\_\_  
\_\_\_\_\_

Task: (New/Existing)

\_\_\_\_\_

Scheduled Days: \_\_\_\_\_ Staff Assigned: \_\_\_\_\_

Start Date: \_\_\_\_\_

Budget: \_\_\_\_\_ No Impact \_\_\_\_\_ Contingency Fund

Schedule: \_\_\_\_\_ No Impact \_\_\_\_\_ Slip

Submitted by:

\_\_\_\_\_  
TSC Team Leader Date

\_\_\_\_\_ Approved \_\_\_\_\_ Not Approved

\_\_\_\_\_  
Project Manager Date

Appendix B

# **Style Guide for Reclamation Design Standards**



## **Appendix B**

# **Style Guide for Reclamation Design Standards**

The following pages show the required Visual Identity (VI) format for the design standards cover and for the use of headings in design standards.





# RECLAMATION

*Managing Water in the West*

**Design Standards No.** (insert design standard No.)  
(insert design standard title)

**Chapter** (insert chapter No.)  
**(Insert Chapter Name)**

(If draft, insert review phase and date)



**U.S. Department of the Interior**  
**Bureau of Reclamation**

(insert month and year)



# Table of Contents

“Contents” should appear at the top of the page in Arial 18 point bold. The word “page” should appear 2 line spaces below it, be positioned flush right, and be Times New Roman 11 point bold. Text is Times New Roman 12 point.

## Chapter Number

The chapter number is in Arial 12 point bold. Under “Format, Paragraph,” set spacing to Before: 0 points, After: 6 points.

## Chapter Title

The chapter title is in Arial 21 point bold. Under “Format, Paragraph,” set to Before: 0 points, After: 12 points, Line Spacing: single.

## Heading 1

Heading 1 is Arial 18 point bold. Align flush left. Under “Format, Paragraph,” set to Before: 0 points, After: 12 points, Line Spacing: single.

## Heading 2

Heading 2 is Arial 15 point bold. Align flush left. Under, “Format, Paragraph,” set to Before: 24 points, After: 12 points, Line Spacing: single. However, if heading 2 appears at the top of a page, it is not necessary to have spacing before the heading.

## Heading 3

Heading 3 is Arial 12 point bold. Align flush left. Under “Format, Paragraph,” set to Before: 12 points, After: 2 points, Line Spacing: single. However, if heading 2 appears at the top of a page, it is not necessary to have spacing before the heading.

## *Heading 4*

Heading 4 is Arial 11 point bold italic. Flush left. Under “Format, Paragraph,” set to Before: 12 points, After: 2 points, Line Spacing: single.

**Heading 5** **Heading 5 is Times New Roman 12 point bold. Align flush left. Begin sentence three spaces following the heading.** Under “Format, Paragraph,” set to Before: 12 points, After: 2 points, Line Spacing: single.

*Heading 6* **Heading 6 is Times New Roman 12 point italic. Align flush left. Begin sentence three spaces following the heading.** Under “Format, Paragraph,” set to Before: 12 points, After: 2 points, line spacing single.

## **Design Standards No. 1, General Design Standards**

Heading 7 *Heading 7 is Times New Roman 12 point italic. Indent 0.50 inch. Begin sentence three spaces following the heading.* Under “Format, Paragraph,” set to Before: 12 points, After: 2 points, Line Spacing: single.

Body text of the report is Times New Roman 12 point. Flush left. Under “Format, Paragraph,” set spacing to Before: 0 points, After: 12 points.

The header and footer should be Arial 10 point regular text (not bold or centered).

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.

These paragraphs of text are included here to force a second page, so that the header and footer are visible.



**Chapter Signature Sheet  
Bureau of Reclamation  
Technical Service Center  
Plant Structures Group**

**Design Standard No. 1**

# **General Design Standards**

## **Chapter 2: Design Standards Index and Status**

**DS-1(2)-1: Draft Phase 3 (Public Review), January 2009**

Summary of Changes:

### **Revisions**

The index and status tables were previously in chapter 1 and have now been relocated to chapter 2.

The index and status tables show the currently posted design standards and the design standards proposed to be updated by 2012.

### **Prepared by:**

\_\_\_\_\_  
Arthur Glickman, P.E.  
Design Standard Team Leader

\_\_\_\_\_  
Date

### **Technical Approval:**

Not required

\_\_\_\_\_  
Date

**Peer Review:**

\_\_\_\_\_  
Mike O'Shea, P.E.

\_\_\_\_\_  
Date

**Submitted:**

\_\_\_\_\_  
Richard LaFond, P.E., Design Group Manager

\_\_\_\_\_  
Date

**Security Review:**

\_\_\_\_\_  
Division Security Reviewer

\_\_\_\_\_  
Date

**Approved:**

\_\_\_\_\_  
Lowell Pimley, Chief, Civil Engineering Division

\_\_\_\_\_  
Date



# Contents

	<i>Page</i>
Design Standards No. 1 – General Design Standards.....	2-1
Design Standards No. 2 – Concrete Dams (currently not posted) .....	2-1
Design Standards No. 3 – Water Conveyance Facilities, Fish Facilities, and Roads and Bridges.....	2-2
Design Standards No. 4 – Electrical Apparatus and Systems.....	2-3
Design Standards No. 5 – Field Installation Procedures.....	2-4
Design Standards No. 6 – Turbine and Pumps (currently not posted).....	2-4
Design Standards No. 7 – Valves, Gates, and Steel Conduits (currently not posted).....	2-5
Design Standards No. 8 – Miscellaneous Mechanical Equipment (currently not posted).....	2-5
Design Standards No. 9 – Buildings and Other Structures .....	2-6
Design Standards No. 10 – Switchyard and Substation Structures .....	2-7
Design Standards No. 11 – None	
Design Standards No. 12 – Plant Testing .....	2-8
Design Standards No. 13 – Embankment Dams .....	2-9
Design Standards No. 14 – Appurtenant Structures for Dams .....	2-10



## Design Standards No. 1: General Design Standards

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
1				General Design Standards		Plant Structures Group 86-68120
	1		9	Preparing and Using Design Standards	Draft posted on Intranet	
	2	New	1	Design Standards Index and Status	Draft posted on Intranet	
	3		7	Safety Design Standards	Posted on Intranet: Will be retained until the current design standards update phase is complete	

## Design Standards No. 2: Concrete Dams

Design Standard No. 2 is not posted on the Intranet. New chapters, listed in the table, are in the process of being developed and are scheduled to be completed by September 2010. Use appropriate publications (i.e., *Design of Arch Dams*, *Design of Gravity Dams*, or *Design of Small Dams*) until the design standards are completed and drafts posted.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
2					Not posted	Structural Analysis Group 86-68110
	1			Introduction		
	2			Design Considerations		

## Design Standards No. 3: Water Conveyance Facilities, Fish Facilities, and Roads and Bridges

The new chapter scheme is shown in the column for proposed chapters. There is no direct correlation between the chapters developed in 1967 and the proposed chapters. Note that Chapter 4 in the currently posted design standards appears twice: 1967 posting for diversion headworks and 1994 posting for tunnels, shafts, and caverns. The current chapters are archived on the Intranet Web site.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title – Currently Posted Chapters	Proposed Chapters	Current Status	Contact
3				Canals and Related Structures			Water Conveyance – 86-68140
	1	1967	5	General Design Information	Open Channels		
	2	1967	5	Canals and Laterals	Canal Structures and Canal Automation		
	3	1967	5	Diversion Dams	Diversion Dams and Headworks		
	4	1967	5	Diversion Headworks	None		
	4	1994	2	Tunnels, Shafts, and Caverns	Tunnels, Shafts, and Caverns		
	5	1967	5	Canal Structures	Fish Facilities		
	6	1967	5	Water Measurement Structures	Water Measurement		
	7	1967	5	Cross Drainage and Protective Structures	Cross Drainage		
	8	1967	5	Pipe Distribution Systems	Pipelines and Pipe Distribution Systems		
	9	1967	5	Bridges	Bridges and Roads		

<b>Std. No.</b>	<b>Chapter No.</b>	<b>Last Rev.</b>	<b>Current Rev. No.</b>	<b>Standard/Chapter Title – Currently Posted Chapters</b>	<b>Proposed Chapters</b>	<b>Current Status</b>	<b>Contact</b>
	10			None	N/A		
	11	1994	2	General Hydraulic Considerations	General Hydraulic Considerations		
	12	1994	2	General Structural Considerations	General Structural Considerations		
	13		(1)		Safety Standards for Water Conveyance and Fish Facilities		

## **Design Standards No. 4: Electrical Apparatus and Systems**

Except as noted, the current chapters are archived on the Intranet.

<b>Std. No.</b>	<b>Chapter No.</b>	<b>Last rev.</b>	<b>Current Rev. No.</b>	<b>Standard/Chapter Title</b>	<b>Current Status</b>	<b>Contact</b>
4				Electrical Apparatus and Systems		Electrical Plants 86-68430
	1	1985	12	General Considerations for Power, Pumping, and Pumped-Storage Plants		
	2	1984	12	Electrical Rotating Machinery		
	3	1984	12	Associated Electrical Equipment		
	4			None		
	5			Switchyards/ Substations	Not posted	
	6			Powerplant Control/Station-Service Equipment	Not posted	
	7			None		
	8			None		
	9	1986	13	Grounding Methods		
	10			None		

## Design Standards No. 5: Field Installation Procedures

Std. No.	Chapter No.	Last rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
5				Field Installation Procedure		Electrical Plants 86-68430
	1			None		
	2	1986	16	Electrical Standards for Equipment Installation		
	3	1963	8	None		

## Design Standards No. 6: Turbine and Pumps

Design Standard No. 6 is currently not posted.

Std. No.	Chapter No.	Last rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
6				Turbine and Pumps	Not posted	Hydraulic Equipment 86-68420
	1			Hydraulic Turbines	Refer to Eng. Monograph Nos. 20 (Selecting Hydraulic Turbines) and 39 (Estimating Reversible Pump-Turbine Characteristics)	
	2			Hydraulic Appurtenances		
	3			Station Service Piping		
	4			Pumping Plants	Refer to Eng. Monograph 40 (Selecting Large Pumping Units)	
	5			Pumping Plant Auxiliaries		

## Design Standards No. 7: Valves, Gates, and Steel Conduits

Design Standard No. 7 is currently not posted.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
7				Valves, Gates, and Steel Conduits	Not posted	Hydraulic Equipment 86-68420
	1			Hydraulic Valves and Gates		
	2			Closed Steel Conduits		

## Design Standards No. 8: Miscellaneous Mechanical Equipment

Design Standard No. 8 is currently not posted.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
8				Miscellaneous Mechanical Equipment	Not posted	Mechanical Equipment 86-68410
				Handling Facilities and Shop Equipment		
				Tanks		
				De-Icing Systems		
				Heating, Ventilating, and Cooling	DELETE CHAPTER. Replace with Design Guide for Heating, Ventilating, and Air Conditioning Systems.	

## Design Standards No. 9: Buildings and Other Structures

The currently posted and proposed chapters are shown below. Note that some chapters will be deleted and some chapters will address new topics.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Currently Posted Chapters	Proposed Chapters	Current Status	Contact
9				Buildings			Plant Structures 86-68120
	1	1959	2	General Structural Design Procedures and Standards	General Structural Design Procedures and Standards		
	2	1959	2	Structural Design Data	Structural Design Data and Criteria		
	3	1959	2	Concrete Design	Concrete Design and Details		
	4	1961	3	Concrete Details	Steel Design and Details		
	5	1959	2	Steel Design and Details	Architectural Design		
	6	1961	3	Architectural Treatment	Timber Design Criteria		
	7	1972	4	Plant Structure Type	Masonry Design Criteria		
	8				Modification of Existing Structures	Not posted	
	9				Instrumentation and Monitoring	Not posted	
	10				Plant Structure Type	Not posted	



Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Currently Posted Chapters	Proposed Chapters	Current Status	Contact
	11				Special Structural Materials	Not posted	
	12				Site Design	Not posted	
	13				Seismic Design	Not posted	
	14				Accessibility Design	Not posted	
	15				Design for Life Safety	Not posted	
	16				Security Assessment & Design Criteria for Buildings	Not posted	
	17				Special Structures	Not posted	
	18				Sustainable Design	Not posted	

## Design Standards No. 10: Switchyard and Substation Structures

Currently, only chapter 3 (Volume of standard drawings) of these design standards is archived. Also, the current title for Design Standards No. 10 is *Transmission Structures*.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
10				Switchyard and Substation Structures	Current design standard title is <i>Transmission Structures</i>	Plant Structures 86-68120
	1			Steel Design and Details		
	2			Concrete Footing Design		
	3	1986	9	Distribution and Transmission Line Standard Drawings – Volumes 1 and 2.	Currently only volume of standard drawings is posted.	

## Design Standards No. 12: Plant Testing

This design standard will be updated as shown below.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
12				Plant Testing		Hydraulic Research and Technical Services 86-68450
	1			Field Turbine Pump Tests	Currently not posted. Replace with ASME PTC-18, Performance Test Code for Hydraulic Turbines and Pump-Turbines	
	2	1984	6	Field Generator, Motor, and Generator/Motor Tests	Posted on Intranet	
	3			Carbon Dioxide Equipment	Currently not posted. Replace with NFPA 12 – Carbon Dioxide Fire Extinguishing Systems	

## Design Standards No. 13: Embankment Dams

The current chapters are archived on the Intranet Web site.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
13				Embankment Dams		Geotechnical Engineering 86-68312 86-68313
	1	1986	2	General Design Standards		
	2	D 1992	9	Embankment Design		
	3	1984	1	Foundation Surface Treatment		
	4	1987	5	Static Stability Analysis		
	5	20076/87	4	Protective Filters	Updated 2007	
	6	D 1984		Freeboard		
	7	2001	10	Riprap Slope Protection		
	8	1987	3	Seepage Analysis and Control		
	9	1992D	16	Static Deformation Analysis		
	10	1994D	15	Embankment Construction		
	11	1990	8	Instrumentation		
	12	1989	6	Foundation and Earth Materials Investigations		
	13	2001 12/89	7	Seismic Design Analysis, Draft	Updated 2001	
	14	1984		Guidelines to Decision Analysis		
	16	D	13	Cutoff Walls		
	17	1990D	12	Soil-Cement Slope Protection		
	19	1992	11	Geotextiles		
	20	19929/91	14	Geomembranes		

## Design Standards No. 14: Appurtenant Structures for Dams

This design standard is currently not posted.

Std. No.	Chapter No.	Last Rev.	Current Rev. No.	Standard/Chapter Title	Current Status	Contact
14				Appurtenant Structures (Spillways and Outlet Works)	Not posted	Waterways and Concrete Dams 86-68130
	1			Introduction		
	2			Hydrologic Considerations		
	3			General Spillway Design Considerations		
	4			General Outlet Works and Diversion Design Considerations		
	5			Hydraulic Considerations Spillways Outlet Works		
	6			Structural Considerations Spillways Outlet Works		
	7			Safety of Dams Considerations		